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Abstract

PURPOSE:To grow the titled thin film by adsorbing a group-III halide on a substrate crystal in an inert atmosphere, then absorbing a group-V element thereon in a reducing atmosphere, repeating the process, and controlling each growth layer at a high growth velocity. CONSTITUTION:A reaction tube 1 consisting of the first chamber 12 and the second chamber 13 is provided with a substrate holder 15 to which an InP substrate 14, for example, is fixed and which can be inserted alternately into the two chambers through a bellows 19. A group-V halide (hereinafter referred to as PH3) for the second chamber and H2 as a reducing gas are charged into the second chamber 13 of the reaction tube, a group-III element 17 (hereinafter referred to as metallic In) put in a quartz dish is heated by a 2-zone furnace 16 to 650-900 deg.C, and the substrate 14 is heated to 500-800 deg.C. Then N2 as an inert gas, PH3, and HCl are introduced into the first chamber 12, the formed InCl3 is adsorbed on the surface of the substrate 2, and then the substrate 2 is inserted into the second chamber 13 wherein PH3 is adsorbed in the reducing atmosphere. Subsequently, the substrate 2 is inserted alternately into the first chamber 12 and the second chamber 13 to epitaxially grow each monoatomic layer. After a desired thickness is obtained, the substrate 2 is held in the second chamber 13 and cooled while protecting surface with PH3.